Fourth Grade MATHEMATICS

Grade **L**evel **C**ontent **E**xpectations
aligned with
Michigan **C**urriculum **F**ramework
Content **S**tandards and **B**enchmarks

MICHIGAN Department of Education
Office of School Improvement
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MATHEMATICS
Fourth Grade

STRAND I: PATTERNS, RELATIONSHIPS, AND FUNCTIONS

Content Standard 1: Patterns

Students recognize similarities and generalize patterns, use patterns to create models and make predictions, describe the nature of patterns and relationships, and construct representations of mathematical relationships.

Key Ideas:
- Recognizing, describing and generalizing patterns is the starting point of mathematics.
- Patterns and relationships are represented and communicated in diverse ways.
- Patterns enable students to describe and understand the physical world and to make informed predictions.
- Recognizing and classifying families of patterns enables students to understand and use their mathematical properties.
- Pattern recognition and analysis provide an important key to solving problems and learning new mathematics.

Elementary (Fourth Grade) Benchmark 1

Recognize, describe, and extend numerical and geometric patterns.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 2

Represent and record patterns and relationships in a variety of ways including tables, charts, and pictures.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 3

Use patterns to describe real-world phenomena.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 4

Explore various types of numeric and geometric patterns (repeating, growing, shrinking).

Alignment	
GLCE Code	**GLCE Description**
None	

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Elementary (Fourth Grade) Benchmark 5
Explore various types of numeric and geometric patterns (repeating, growing, shrinking).

Alignment	
GLCE Code	**GLCE Description**
None	

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Content Standard 2: Variability and Change

Students describe the relationships among variables, predict what will happen to one variable as another variable is changed, analyze natural variation and sources of variability, and compare patterns of change.

Key Ideas:
- Studying change and variability in physical and abstract contexts is an important objective of mathematics.
- Variability becomes understandable when students recognize patterns of change and natural variation.
- Changes are frequently interdependent; understanding patterns of change in one variable can help students predict changes in another.
- Variability is represented in a variety of symbolic forms.
- Functions and relationships are used to model patterns of variability arising from physical and mathematical contexts.
- Understanding variability and change is a basis for making sense of the world and of mathematical ideas.

Elementary (Fourth Grade) Benchmark 1

Recognize change and variability when it occurs in a variety of settings.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 2

Recognize that change is often predictable, but variable, and that patterns emerge that help to describe the change.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 3

Explore change, and realize that changes are frequently interdependent.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 4

Use tables, charts, open sentences, and hands-on models to represent change and variability.

Alignment	
GLCE Code	**GLCE Description**
None	

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Elementary (Fourth Grade) Benchmark 5

Begin to describe and differentiate between types of relationships, especially repeating, growing, and shrinking patterns.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 6

Explore variability and change in a variety of contexts, investigations, and problems.

Alignment	
GLCE Code	**GLCE Description**
None	

MATHEMATICS

STRAND II: GEOMETRY AND MEASUREMENT

Standard 1: Shape and Shape Relationships

Students develop spatial sense, use shape as an analytic and descriptive tool, identify characteristics and define shapes, identify properties and describe relationships among shapes.

Key Ideas:
- Spatial sense relies on the ability to recognize and describe shape.
- Recognizing attributes and characteristics of shapes is a prerequisite for understanding.
- Comparing, sorting and classifying shapes leads to useful generalizations.
- Drawing and constructing shapes in two and three dimensions are important ways to represent the world.
- Understanding shapes requires recognition of what happens when shapes are combined, dissected or transformed.
- Figures that are alike in size and/or shape and figures that have special relationships to each other lead to important generalizations.
- Shape, shape properties, and shape relationships help students to describe and make sense of the physical world and to solve problems.

Elementary (Fourth Grade) Benchmark 1

Recognize and name familiar shapes in one, two and three dimensions such as lines, rectangles and spheres and informally discuss the shape of a graph.

Alignment	
GLCE Code	**GLCE Description**
G.GS.04.01	Understand perpendicular, parallel, and intersecting lines: -Identify and draw perpendicular, parallel, and intersecting lines using a ruler and a tool or object with a square (90) corner
G.GS.04.02	Identify basic geometric shapes and their components, and solve problems: -Identify basic geometric shapes, including isosceles, equilateral and right triangles, and use their properties to solve problems
G.SR.04.03	Identify basic geometric shapes and their components, and solve problems: -Identify and count the faces, edges, and vertices of basic three-dimensional geometric solids including cubes, rectangular prisms, and pyramids; describe the shape of their faces
M.TE.04.10	Understand right angles: -Identify right angles and compare angles to right angles

Elementary (Fourth Grade) Benchmark 2

Describe the attributes of familiar shapes.

Alignment	
GLCE Code	**GLCE Description**
G.GS.04.02	Identify basic geometric shapes and their components, and solve problems: -Identify basic geometric shapes, including isosceles, equilateral and right triangles, and use their properties to solve problems
G.SR.04.03	Identify basic geometric shapes and their components, and solve problems: -Identify and count the faces, edges, and vertices of basic three-dimensional geometric solids including cubes, rectangular prisms, and pyramids; describe the shape of their faces
M.TE.04.10	Understand right angles: -Identify right angles and compare angles to right angles

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Elementary (Fourth Grade) Benchmark 3

Compare, sort and classify familiar shapes.

Alignment	
GLCE Code	**GLCE Description**
G.GS.04.02	Identify basic geometric shapes and their components, and solve problems: -Identify basic geometric shapes, including isosceles, equilateral and right triangles, and use their properties to solve problems
G.SR.04.03	Identify basic geometric shapes and their components, and solve problems: -Identify and count the faces, edges, and vertices of basic three-dimensional geometric solids including cubes, rectangular prisms, and pyramids; describe the shape of their faces

Elementary (Fourth Grade) Benchmark 4

Draw and build familiar shapes.

Alignment	
GLCE Code	**GLCE Description**
G.GS.04.01	Understand perpendicular, parallel, and intersecting lines: -Identify and draw perpendicular, parallel, and intersecting lines using a ruler and a tool or object with a square (90) corner

Elementary (Fourth Grade) Benchmark 5

Explore ways to combine, dissect and transform shapes.

Alignment	
GLCE Code	**GLCE Description**
G.TR.04.04	Recognize symmetry and transformations: -Recognize plane figures that have line symmetry
G.TR.04.05	Recognize symmetry and transformations: -Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object

Elementary (Fourth Grade) Benchmark 6

Recognize parallel and perpendicular line segments and figures that have similarity and/or congruence.

Alignment	
GLCE Code	**GLCE Description**
G.GS.04.01	Understand perpendicular, parallel, and intersecting lines: -Identify and draw perpendicular, parallel, and intersecting lines using a ruler and a tool or object with a square (90) corner
G.TR.04.05	Recognize symmetry and transformations: -Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object

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Elementary (Fourth Grade) Benchmark 7

Use shape, shape properties and shape relationships to describe the physical world and to solve problems.

Alignment	
GLCE Code	**GLCE Description**
M.TE.04.06	Use perimeter and area formulas: -Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas
M.TE.04.07	Use perimeter and area formulas: -Find one dimension of a rectangle given the other dimension and its perimeter or area
M.TE.04.08	Use perimeter and area formulas: -Find the side of a square given its perimeter or area
M.PS.04.09	Use perimeter and area formulas: -Solve contextual problems about perimeter and area of squares and rectangles in compound shapes
M.PS.04.11	Problem solving: -Solve contextual problems about surface area

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Content Standard 2: Position

Students identify locations of objects, identify location relative to other objects, and describe the effects of transformations (e.g., sliding, flipping, turning, enlarging, reducing) on an object.

Key Ideas:
- Locating physical objects or points in space requires understanding of position.
- Concepts of direction, orientation, relative position and symmetry enable students to describe objects relative to their surroundings.
- Certain actions can change the size, shape, position or orientation of an object.
- Locating all the points that satisfy a condition or the special points that satisfy two or more conditions is an important spatial ability.
- Concepts of position, direction and orientation enable students to describe the physical world and to solve problems.

Elementary (Fourth Grade) Benchmark 1

Locate and describe objects in terms of their position, including front, back, inside, outside, right, left, over, under, next to, between and locations on the number line, on a coordinate graph and on a map.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 2

Locate and describe objects in terms of their orientation, direction and relative position, including up, down, front, back, N- S- E- W, flipped, turned, translated; recognize symmetrical objects and identify their lines of symmetry.

Alignment	
GLCE Code	**GLCE Description**
G.TR.04.04	Recognize symmetry and transformations: -Recognize plane figures that have line symmetry
G.TR.04.05	Recognize symmetry and transformations: -Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object

Elementary (Fourth Grade) Benchmark 3

Explore what happens to the size, shape and position of an object after sliding, flipping, turning, enlarging, or reducing it.

Alignment	
GLCE Code	**GLCE Description**
G.TR.04.04	Recognize symmetry and transformations: -Recognize plane figures that have line symmetry
G.TR.04.05	Recognize symmetry and transformations: -Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object

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Elementary (Fourth Grade) Benchmark 4

(Does not apply at the elementary grades)

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 5

Use concepts of position, direction and orientation to describe the physical world and to solve problems.

Alignment	
GLCE Code	**GLCE Description**
G.TR.04.04	Recognize symmetry and transformations: -Recognize plane figures that have line symmetry
G.TR.04.05	Recognize symmetry and transformations: -Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object

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Content Standard 3: Measurement

Students compare attributes of two objects, or of one object with a standard (unit), and analyze situations to determine what measurement(s) should be made and to what level of precision.

Key Ideas:
- A fundamental component of measurement and learning to measure is the comparison of an object or property to a unit of comparison.
- Measurement requires that students identify the attribute to be measured and an appropriate unit.
- Students develop a better understanding of the physical world if they regularly estimate before they measure and evaluate their estimates after they measure.
- Measurement is incomplete unless students interpret the meaning and significance of their results.
- It is not always possible to measure a quantity directly; in such cases students must use other indirect means.
- Measurement reflects the usefulness and practicality of mathematics and puts students in touch with the physical world.

Elementary (Fourth Grade) Benchmark 1

Compare attributes of objects; develop standard units of measurement; and select and use standard tools for measurement.

Alignment	
GLCE Code	**GLCE Description**
G.GS.04.01	Understand perpendicular, parallel, and intersecting lines: -Identify and draw perpendicular, parallel, and intersecting lines using a ruler and a tool or object with a square (90) corner
M.UN.04.01	Measure using common tools and appropriate units: -Measure using common tools and select appropriate units of measure
M.UN.04.03	Measure using common tools and appropriate units: -Measure and compare integer temperatures in degrees

Elementary (Fourth Grade) Benchmark 2

Identify the attributes to be measured and select the appropriate unit of measurement for length, mass (weight), area, perimeter, capacity, time, temperature and money.

Alignment	
GLCE Code	**GLCE Description**
M.UN.04.01	Measure using common tools and appropriate units: -Measure using common tools and select appropriate units of measure

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Elementary (Fourth Grade) Benchmark 3

Develop strategies for estimating measures and compare the estimates to the results of the measurement; decide if an estimate is "a good estimate."

Alignment	
GLCE Code	**GLCE Description**
M.PS.04.02	Measure using common tools and appropriate units: -Give answers to a reasonable degree of precision in the context of a given problem

Elementary (Fourth Grade) Benchmark 4

Explain the meaning of measurements and recognize that the number of units it takes to measure an object is related to the size of the unit.

Alignment	
GLCE Code	**GLCE Description**
M.TE.04.04	Measure using common tools and appropriate units: -Measure surface area of cubes and rectangular prisms by covering and counting area of the faces
M.TE.04.05	Convert measurement units: -Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations)

Elementary (Fourth Grade) Benchmark 5

Explore scale drawings, models and maps and relate them to measurements of real objects.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 6

Apply measurement to describe the real world and to solve problems.

Alignment	
GLCE Code	**GLCE Description**
M.PS.04.09	Use perimeter and area formulas: -Solve contextual problems about perimeter and area of squares and rectangles in compound shapes
M.PS.04.11	Problem solving: -Solve contextual problems about surface area

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STRAND III: DATA ANALYSIS AND STATISTICS

Content Standard 1: Collection, Organization and Presentation of Data
Students collect and explore data, organize data into a useful form, and develop skill in representing and reading data displayed in different formats.

Key Ideas:
- Data drive many facets of modern society; knowing what data to collect and when and how to obtain them is the starting point of quantitative literacy.
- Data are of little use until they are organized and presented in a meaningful format.
- Since different representations highlight different patterns in the data, students must make critical judgments.
- To solve problems, students frequently must decide what data are needed and plan how to obtain, organize and present them.

Elementary (Fourth Grade) Benchmark 1
Collect and explore data through counting, measuring, and conducting surveys and experiments.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.01	Represent and solve problems for given data: -Construct tables and bar graphs from given data
D.RE.04.02	Represent and solve problems for given data: -Order a given set of data, find the median, and specify the range of values

Elementary (Fourth Grade) Benchmark 2
Organize data using concrete objects, pictures, tallies, tables, charts, diagrams, and graphs.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.01	Represent and solve problems for given data: -Construct tables and bar graphs from given data
D.RE.04.03	Represent and solve problems for given data: -Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs; read bar graphs showing two data sets

Elementary (Fourth Grade) Benchmark 3
Present data using a variety of appropriate representations and explain the meaning of the data.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.03	Represent and solve problems for given data: -Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs; read bar graphs showing two data sets

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Elementary (Fourth Grade) Benchmark 4

Identify what data are needed to answer a particular question or solve a given problem, and design and implement strategies to obtain, organize and present those data.

Alignment	
GLCE Code	**GLCE Description**
None	

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Content Standard 2: Description and Interpretation

Students examine data and describe characteristics of a distribution, relate data to the situation from which they arose, and use data to answer questions convincingly and persuasively.

Key Ideas:
- The ability to read and interpret data has become a basic-literacy skill in today's world.
- Patterns in data distributions help students to interpret the findings.
- Students learn to draw conclusions and to convince and persuade using data to justify their positions.
- Students should think critically about the data they encounter and exercise judgment in describing and interpreting data.
- Gathering and interpreting data are important strategies for analyzing and solving problems.

Elementary (Fourth Grade) Benchmark 1

Read and explain data they have collected and organized themselves and progress to reading data from other sources.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.03	Represent and solve problems for given data: -Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs; read bar graphs showing two data sets

Elementary (Fourth Grade) Benchmark 2

Describe the shape of the data using informal language.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.02	Represent and solve problems for given data: -Order a given set of data, find the median, and specify the range of values

Elementary (Fourth Grade) Benchmark 3

Draw, explain and justify conclusions, such as trends based on data.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.03	Represent and solve problems for given data: -Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs; read bar graphs showing two data sets

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Elementary (Fourth Grade) Benchmark 4

Raise and answer questions about the source, collection, organization and presentation of data, as well as the conclusions drawn from the data; explore biases in the data.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.03	Represent and solve problems for given data: -Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs; read bar graphs showing two data sets

Elementary (Fourth Grade) Benchmark 5

Formulate questions and problems and gather and interpret data to answer those questions.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.01	Represent and solve problems for given data: -Construct tables and bar graphs from given data

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Content Standard 3: Inference and Prediction

Students draw defensible inferences about unknown outcomes, make predictions, and identify the degree of confidence they have in their predictions.

Key Ideas:
- Making and testing hypotheses is an essential technique for gaining new knowledge.
- In order to test hypotheses, students must carefully design their experimental techniques.
- Critical judgment develops as students learn to formulate, communicate and evaluate arguments and conclusions based on data.
- Patterns in known data give students confidence in making inferences about unknown situations.
- Students learn that inferences and predictions are powerful tools for answering questions and solving problems.

Elementary (Fourth Grade) Benchmark 1

Make and test hypotheses.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 2

Conduct surveys, samplings and experiments to solve problems and answer questions of interest to them.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 3

Formulate and communicate arguments and conclusions based on data and evaluate their arguments and those of others.

Alignment	
GLCE Code	**GLCE Description**
D.RE.04.03	Represent and solve problems for given data: -Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs; read bar graphs showing two data sets

Elementary (Fourth Grade) Benchmark 4

Make and explain predictions based on data.

Alignment	
GLCE Code	**GLCE Description**
None	

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Elementary (Fourth Grade) Benchmark 5

Make predictions to answer questions and solve problems.

Alignment	
GLCE Code	**GLCE Description**
None	

MATHEMATICS

STRAND IV: NUMBER SENSE AND NUMERATION

Content Standard 1: Concepts and Properties of Numbers
Students experience counting and measuring activities to develop intuitive sense about numbers, develop understanding about properties of numbers, understand the need for the existence of different sets of numbers, and investigate properties of special numbers.

Key Ideas
- An intuitive quantitative sense develops from students' investigations of numbers and their properties.
- A solid understanding of the numeration system is essential for later success with calculations.
- Important properties provide students with deeper insight into numbers and their uses.
- Numeration systems become most useful as students use them to model and describe problems.

Elementary (Fourth Grade) Benchmark 1
Develop an understanding of whole numbers and read, write and count using whole numbers; investigate basic concepts of fractions and decimals.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.01	Understand and use number notation and place value: -Read and write numbers to 1,000,000; relate them to the quantities they represent; compare and order
N.ME.04.02	Understand and use number notation and place value: -Compose and decompose numbers using place value to 1,000,000's, e.g., 25,068 is 2 ten thousands, 5 thousands, 0 hundreds, 6 tens, and 8 ones
N.ME.04.03	Understand and use number notation and place value: -Understand the magnitude of numbers up to 1,000,000; recognize the place value's of numbers, and the relationship of each place value to the place to its right, e.g., 1,000 is 10 hundreds
N.ME.04.15	Read, interpret and compare decimal fractions: -Read and interpret decimals up to two decimal places; relate to money and place value decomposition
N.ME.04.16	Read, interpret and compare decimal fractions: -Know that terminating decimals represent fractions whose denominators are 10, 10 x 10, 10 x 10 x 10, etc. e.g., powers of 10
N.ME.04.17	Read, interpret and compare decimal fractions: -Locate tenths and hundredths on a number line
N.ME.04.18	Read, interpret and compare decimal fractions: -Read, write, interpret, and compare decimals up to two decimal places
N.ME.04.20	Read, interpret and compare decimal fractions: -Understand fractions as parts of a set of objects

Elementary (Fourth Grade) Benchmark 2
Investigate and develop an understanding of the base-10 place-value system.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.15	Read, interpret and compare decimal fractions: -Read and interpret decimals up to two decimal places; relate to money and place value decomposition

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Alignment	
GLCE Code	**GLCE Description**
N.ME.04.17	Read, interpret and compare decimal fractions: -Locate tenths and hundredths on a number line
N.ME.04.18	Read, interpret and compare decimal fractions: -Read, write, interpret, and compare decimals up to two decimal places
N.MR.04.19	Read, interpret and compare decimal fractions: -Write tenths and hundredths in decimal and fraction forms, and know the decimal equivalents for halves and fourths

Elementary (Fourth Grade) Benchmark 3

Develop an understanding of the properties of numbers (e.g., order) and of the properties of the special numbers 0 and 1.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.02	Understand and use number notation and place value: -Compose and decompose numbers using place value to 1,000,000's, e.g., 25,068 is 2 ten thousands, 5 thousands, 0 hundreds, 6 tens, and 8 ones
N.ME.04.03	Understand and use number notation and place value: -Understand the magnitude of numbers up to 1,000,000; recognize the place value's of numbers, and the relationship of each place value to the place to its right, e.g., 1,000 is 10 hundreds
N.ME.04.09	Multiply and divide whole numbers: -Multiply two-digit numbers by 2, 3, 4, and 5, using the distributive property, e.g.,21 x 3 = (1 + 20) x 3 = (1 x 3) + (20 x 3) = 3 + 60 = 63

Elementary (Fourth Grade) Benchmark 4

Apply their understanding of number systems to model and solve problems.

Alignment	
GLCE Code	**GLCE Description**
N.MR.04.31	Add and subtract decimal fractions: -Use mathematical statements to represent problems that use addition and subtraction of decimals with up to two-digits; solve
N.MR.04.37	Problem solving: -Solve applied problems using the four basic arithmetic operations, for appropriate fractions, decimals, and whole numbers

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Content Standard 2: Representation and Uses of Numbers
Students recognize that numbers are used in different ways such as counting, measuring, ordering and estimating, understand and produce multiple representations of a number, and translate among equivalent representations.

Key Ideas:
- Students recognize and understand numbers that they encounter in varied formats.
- Numeracy requires that students recognize when numbers are equivalent even though they may be represented in different formats.
- Numbers are used for varied purposes, and it is important to differentiate among their uses.
- Estimation is one of the most important skills for students to develop and use on a regular basis.
- Knowing what numbers to use and how to represent them is key to students' abilities to solve problems.

Elementary (Fourth Grade) Benchmark 1
Represent whole numbers, fractions and decimals using concrete, pictorial and symbolic representations.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.03	Understand and use number notation and place value: -Understand the magnitude of numbers up to 1,000,000; recognize the place value's of numbers, and the relationship of each place value to the place to its right, e.g., 1,000 is 10 hundreds
N.ME.04.15	Read, interpret and compare decimal fractions: -Read and interpret decimals up to two decimal places; relate to money and place value decomposition
N.ME.04.16	Read, interpret and compare decimal fractions: -Know that terminating decimals represent fractions whose denominators are 10, 10 x 10, 10 x 10 x 10, etc. e.g., powers of 10
N.ME.04.18	Read, interpret and compare decimal fractions: -Read, write, interpret, and compare decimals up to two decimal places
N.MR.04.19	Read, interpret and compare decimal fractions: -Write tenths and hundredths in decimal and fraction forms, and know the decimal equivalents for halves and fourths
N.ME.04.20	Understand fractions: -Understand fractions as parts of a set of objects
N.MR.04.22	Understand fractions: -Locate and compare fractions on the number line, including improper fractions and mixed numbers with denominators of 12 or less
N.MR.04.24	Understand fractions: -Know that fractions of the form $\frac{m}{n}$, where m is greater than n, are greater than 1 and are called improper fractions; locate improper fractions on the number line; express as mixed numbers
N.MR.04.25	Understand fractions: -Write improper fractions as mixed numbers, and understand that a mixed number represents the number of "wholes" and the part of a whole remaining, e.g., $\frac{5}{4} \rightarrow 1 \blacksquare \frac{1}{4} \rightarrow 1\frac{1}{4}$

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Elementary (Fourth Grade) Benchmark 2

Explore and recognize different representations for the same number and explain why they are the same.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.18	Read, interpret and compare decimal fractions: -Read, write, interpret, and compare decimals up to two decimal places
N.MR.04.21	Understand fractions: -Explain why equivalent fractions are equal, using models such as fraction strips or the number line, for fractions with denominators of 12 or less, or equal to 100
N.MR.04.22	Understand fractions: -Locate and compare fractions on the number line, including improper fractions and mixed numbers with denominators of 12 or less
N.MR.04.23	Understand fractions: -Understand the relationships among halves, fourths and eighths and among thirds, sixths and twelfths
N.MR.04.24	Understand fractions: -Know that fractions of the form $\frac{m}{n}$, where m is greater than n, are greater than 1 and are called improper fractions; locate improper fractions on the number line; express as mixed numbers
N.MR.04.26	Understand fractions: -Compare and order up to three fractions with denominators 2, 4, and 8, and 3, 6, and 12, including improper fractions and mixed numbers

Elementary (Fourth Grade) Benchmark 3

Investigate ways numbers are used (e.g., counting, ordering, naming, locating, measuring).

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.01	Understand and use number notation and place value: -Read and write numbers to 1,000,000; relate them to the quantities they represent; compare and order

Elementary (Fourth Grade) Benchmark 4

Develop strategies for estimating quantity and evaluate the reasonableness of their estimates.

Alignment	
GLCE Code	**GLCE Description**
N.FL.04.34	Estimate: -Estimate the answers to calculations involving addition, subtraction, or multiplication
N.FL.04.35	Estimate: -Know when approximation is appropriate and use it to check the reasonableness of answers; be familiar with common place-value errors in calculations
N.FL.04.36	Estimate: -Make appropriate estimations and calculations fluently with whole numbers using mental math strategies

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Elementary (Fourth Grade) Benchmark 5

Select appropriate numbers and representations in order to solve problems.

Alignment	
GLCE Code	**GLCE Description**
N.MR.04.30	Multiply fractions by whole numbers: -Multiply fractions by whole numbers, using repeated addition and area or array models
N.MR.04.37	Problem solving: -Solve applied problems using the four basic arithmetic operations, for appropriate fractions, decimals, and whole numbers

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Content Standard 3: Number Relationships

Students investigate relationships such as equality, inequality, inverses, factors and multiples, and represent and compare very large and very small numbers.

Key Ideas:
- Relationships of equality and inequality are among the most fundamental in mathematics.
- Students learn the importance of making comparisons between numbers, especially as ratios and rates.
- By classifying numbers according to their properties and identifying important numerical relationships, students develop a deeper understanding of numbers.
- Numbers that are related exponentially exhibit important relationships that students will encounter in a variety of applications.
- Students can invoke important number relationships to help them understand and solve problems.

Elementary (Fourth Grade) Benchmark 1

Compare and order numbers using "equal," "less than" or "greater than."

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.03	Understand and use number notation and place value: -Understand the magnitude of numbers up to 1,000,000; recognize the place value's of numbers, and the relationship of each place value to the place to its right, e.g., 1,000 is 10 hundreds
N.ME.04.17	Read, interpret and compare decimal fractions: -Locate tenths and hundredths on a number line
N.ME.04.18	Read, interpret and compare decimal fractions: -Read, write, interpret, and compare decimals up to two decimal places
N.ME.04.23	Understand fractions: -Understand the relationships among halves, fourths and eighths and among thirds, sixths and twelfths
N.MR.04.26	Understand fractions: -Compare and order up to three fractions with denominators 2, 4, and 8, and 3, 6, and 12, including improper fractions and mixed numbers

Elementary (Fourth Grade) Benchmark 2

Use part-whole relationships to explore numbers, develop number concepts and understand computation.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.04	Use factors and multiples: -Find all factors of a whole number up to 50, and list factor pairs
N.ME.04.20	Understand fractions: -Understand fractions as parts of a set of objects
N.MR.04.21	Understand fractions: -Explain why equivalent fractions are equal, using models such as fraction strips or the number line, for fractions with denominators of 12 or less, or equal to 100
N.MR.04.22	Understand fractions: -Locate and compare fractions on the number line, including improper fractions and mixed numbers with denominators of 12 or less

MATHEMATICS

Elementary (Fourth Grade) Benchmark 3

Classify numbers as even or odd and explore concepts of factors and multiples.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.04	Use factors and multiples: -Find all factors of a whole number up to 50, and list factor pairs
N.ME.04.05	Use factors and multiples: -List the first ten multiples of a given one-digit whole number; determine if a whole number is a multiple of a given one-digit whole number, and if a one-digit number is a factor of a given whole number
N.MR.04.06	Use factors and multiples: -Know that some numbers, including 2, 3, 5, 7, and 11 have exactly two factors (1 and the number itself) and are called prime numbers
N.MR.04.07	Use factors and multiples: -Solve problems about factors and multiples; e.g., since 100 = 4 x 25, and 200 = 2 x 100, then 200 = 2 x 4 x 25 = 8 x 25

Elementary (Fourth Grade) Benchmark 4

(Does not apply at the elementary grades)

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 5

Apply their understanding of number relationships in solving problems.

Alignment	
GLCE Code	**GLCE Description**
N.MR.04.37	Problem solving: -Solve applied problems using the four basic arithmetic operations, for appropriate fractions, decimals, and whole numbers

MATHEMATICS

STRAND V: NUMERICAL AND ALGEBRAIC OPERATIONS AND ANALYTICAL THINKING

Content Standard 1: Operations and their Properties
Students understand and use various types of operations (e.g., addition, subtraction, multiplication, division) to solve problems.

Key Ideas:
- Understanding the basic computational operations is essential for competence in mathematics, but there is no one way to perform a calculation.
- Methods of computation include proficiency with mental calculation, paper and pencil, and calculators; students must know which method is most appropriate for a given task.
- Understanding the operations requires that students also understand the properties of those operations and how to apply them.
- The ultimate reason for mastering the computational operations and their algorithms is to solve problems.

Elementary (Fourth Grade) Benchmark 1
Use manipulatives to model operations with numbers; develop their own methods of recording operations; and relate their models and recordings to standard symbolic expressions and algorithms.

Alignment	
GLCE Code	**GLCE Description**
N.MR.04.30	Multiply fractions by whole numbers: -Multiply fractions by whole numbers, using repeated addition and area or array models

Elementary (Fourth Grade) Benchmark 2
Develop and apply the appropriate method of computation from among mental computation, estimation, paper-and-pencil or calculators; explain why they are choosing a method and how they know which operations to perform in a given situation.

Alignment	
GLCE Code	**GLCE Description**
N.FL.04.08	Add and subtract whole numbers: -Add and subtract whole numbers fluently
N.ME.04.09	Multiply and divide whole numbers: -Multiply two-digit numbers by 2, 3, 4, and 5, using the distributive property, e.g.,21 x 3 = (1 + 20) x 3 = (1 x 3) + (20 x 3) = 3 + 60 = 63
N.FL.04.10	Multiply and divide whole numbers: -Multiply fluently any whole number by a one-digit number, and a three-digit number by a two-digit number; for two-digit by one-digit multiplication, use distributive property to develop meaning for the algorithm
N.FL.04.11	Multiply and divide whole numbers: -Divide numbers up to four-digits by one-digit numbers and by 10
N.MR.04.27	Add and subtract fractions: -Add and subtract fractions less than 1 with denominators 12 or less and including 100, in cases where the denominators are equal or when one denominator is a multiple of the other; e.g., $\frac{1}{12} \Rightarrow \frac{5}{12} \rightarrow \frac{6}{12}$; $\frac{2}{25} \Rightarrow \frac{7}{50} \rightarrow \frac{11}{50}$.
N.MR.04.27	Add and subtract fractions: -Solve fraction problems involving sums and differences for fractions where one denominator is a multiple of the other (denominators 2 through 12, and 100)

MATHEMATICS

Alignment	
GLCE Code	**GLCE Description**
N.FL.04.32	Add and subtract decimal fractions: -Add and subtract decimals up to two decimal places
N.FL.04.33	Multiply and divide decimal fractions: -Multiply and divide decimals up to two decimal places by a one-digit whole number where the result is a terminating decimal, e.g., 0.42 ÷ 3 = 0.14, but not 5 ÷ 3 = $1.\overline{6}$
N.FL.04.34	Estimate: -Estimate the answers to calculations involving addition, subtraction, or multiplication
N.FL.04.35	Estimate: -Know when approximation is appropriate and use it to check the reasonableness of answers; be familiar with common place-value errors in calculations
N.FL.04.36	Estimate: -Make appropriate estimations and calculations fluently with whole numbers using mental math strategies

Elementary (Fourth Grade) Benchmark 3

Explore properties of operations (e.g., commutative and distributive properties) and give examples of how they use those properties.

Alignment	
GLCE Code	**GLCE Description**
N.ME.04.02	Understand and use number notation and place value: -Compose and decompose numbers using place value to 1,000,000's, e.g., 25,068 is 2 ten thousands, 5 thousands, 0 hundreds, 6 tens, and 8 ones
N.ME.04.09	Multiply and divide whole numbers: -Multiply two-digit numbers by 2, 3, 4, and 5, using the distributive property, e.g.,21 x 3 = (1 + 20) x 3 = (1 x 3) + (20 x 3) = 3 + 60 = 63
N.FL.04.10	Multiply and divide whole numbers: - Multiply fluently any whole number by a one-digit number, and a three-digit number by a two-digit number; for two-digit by one-digit multiplication, use distributive property to develop meaning for the algorithm
N.MR.04.13	Multiply and divide whole numbers: -Use the relationship between multiplication and division to simplify computations and check results
N.ME.04.16	Read, interpret and compare decimal fractions: -Know that terminating decimals represent fractions whose denominators are 10, 10 x 10, 10 x 10 x 10, etc. e.g., powers of 10

Elementary (Fourth Grade) Benchmark 4

Apply operations efficiently and accurately in solving problems.

Alignment	
GLCE Code	**GLCE Description**
N.FL.04.14	Multiply and divide whole numbers: -Solve applied problems involving whole number multiplication and division
N.FL.04.28	Add and subtract fractions: -Solve fraction problems involving sums and differences for fractions where one denominator is a multiple of the other (denominators 2 through 12, and 100)

MATHEMATICS

Alignment	
GLCE Code	**GLCE Description**
N.MR.04.31	Add and subtract decimal fractions: -Use mathematical statements to represent problems that use addition and subtraction of decimals with up to two-digits; solve
N.MR.04.37	Problem solving: -Solve applied problems using the four basic arithmetic operations, for appropriate fractions, decimals, and whole numbers

MATHEMATICS

Content Standard 2: Algebraic and Analytic Thinking

Students analyze problems to determine an appropriate process for solution, and use algebraic notations to model or represent problems.

Key Ideas:
- Students develop both symbol sense and number sense as they learn to read, write and speak the language of mathematics.
- Mathematical representations, which may be numerical, literal, symbolic, graphical, pictorial or physical, enable students to visualize and understand problems.
- Solving mathematical problems involves a process as well as a product; the context of the problem determines the nature of the solution.
- Students learn analytic thinking most effectively when it is studied in the context of problems and applications.
- Students employ algebraic and analytic thinking and the power of technology to explore problems that reveal the many ways that mathematics is used in a wide variety of contemporary applications.

Elementary (Fourth Grade) Benchmark 1

Write and solve open sentences (e.g., ◇ + Δ = 5) and write stories to fit the open sentence.

Alignment	
GLCE Code	**GLCE Description**
N.FL.04.12	Multiply and divide whole numbers: -Find unknowns in equations such as $a \div 10 = 25; 125 \div b = 25$

Elementary (Fourth Grade) Benchmark 2

Explore algebraic concepts with manipulatives such as balance scales, tables of input and output, and pictorial representations of problems.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 3

Find replacements for the variable(s) in open sentences.

Alignment	
GLCE Code	**GLCE Description**
N.FL.04.12	Multiply and divide whole numbers: -Find unknowns in equations such as $a \div 10 = 25; 125 \div b = 25$
N.FL.04.29	Multiply and divide whole numbers: -Solve for the unknown in equations such as: $\frac{1}{8} + x = \frac{5}{8}$ or $\frac{3}{4} - y = \frac{1}{2}$

MATHEMATICS

Elementary (Fourth Grade) Benchmark 4

Use analytic thinking to describe situations and solve problems.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 5

(Does not apply at the elementary grades)

Alignment	
GLCE Code	**GLCE Description**
None	

MATHEMATICS

STRAND VI: PROBABILITY AND DISCRETE MATHEMATICS

Content Standard 1: Probability

Students develop an understanding of the notion of certainty and of probability as a measure of the degree of likelihood that can be assigned to a given event based on the knowledge available, and make critical judgments about claims that are made in probabilistic situations.

Key Ideas:
- Students develop an understanding of the concepts of chance and uncertainty.
- Students express the likelihood of chance events in terms of probabilities.
- Through experiments students learn that some outcomes are affected by prior events, while others are independent.
- Students also learn to examine outcomes and search for explanations, and they realize the difference between probabilities determined from observations and probabilities derived mathematically.
- Making predictions and decisions in the face of uncertainty are essential skills for coping with the modern world.

Elementary (Fourth Grade) Benchmark 1

Explain the difference between chance and certainty and give examples to illustrate their understanding.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 2

Compare events and describe them as "more likely" or "less likely" and use the language of fractions to describe simple probabilities.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 3

Conduct experiments with concrete objects to explore concepts and develop an intuitive understanding of how the conditions of the experiment can affect the outcome.

Alignment	
GLCE Code	**GLCE Description**
None	

MATHEMATICS

Elementary (Fourth Grade) Benchmark 4

Conduct experiments, record the outcomes, examine those outcomes to determine if they make sense and search for explanations of the outcomes.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 5

Conduct probability experiments and simulations to model and solve problems.

Alignment	
GLCE Code	**GLCE Description**
None	

MATHEMATICS

Content Standard 2: Discrete Mathematics

Students investigate practical situations such as scheduling, routing, sequencing, networking, organizing and classifying, and analyze ideas like recurrence relations, induction, iteration, and algorithm design.

Key Ideas:
- Problems involving counting and arranging finite collections of objects occur in many applications.
- Concepts of sets and set relationships give students useful tools for representing problems.
- Many important practical applications involve networks.
- Many important practical applications are modeled by recurrence relations.
- Mathematical applications frequently require students to develop their own procedures for solving problems.
- Applications of discrete mathematics drawn from many important practical situations introduce students to contemporary uses of mathematics.

Elementary (Fourth Grade) Benchmark 1

Use manipulatives and diagrams to explore problems involving counting and arranging objects.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 2

Explore sets and set relationships by sorting and classifying objects.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 3

Explore situations in which they model and trace paths using figures consisting of vertices connected by edges.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 4

Explore now-next patterns.

Alignment	
GLCE Code	**GLCE Description**
None	

MATHEMATICS

Elementary (Fourth Grade) Benchmark 5
Explore, develop and invent their own algorithms to accomplish a task or to solve numerical problems.

Alignment	
GLCE Code	**GLCE Description**
None	

Elementary (Fourth Grade) Benchmark 6
Use discrete mathematics concepts as described above to model situations and solve problems; and look for whether or not there is a solution (existence problems), determine how many solutions there are (counting problems) and decide upon a best solution (optimization problems).

Alignment	
GLCE Code	**GLCE Description**
None	

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